AMENDMENTS TO THE CLAIMS

1. (currently amended): A composition comprising:

a ~~functionalized~~ fluorescent core/shell nanocrystal functionalized to be water soluble; said nanocrystal ~~comprising~~ operably bonded to a plurality of polynucleotide strands of predetermined sequence, said polynucleotide strands of predetermined sequence able to hybridize under suitable conditions with complementary polynucleotide strands operably bonded to fluorescent core/shell nanocrystals functionalized to be water soluble, ~~wherein~~ a terminal portion of each of the plurality of polynucleotide strands of predetermined sequence is operably linked to the ~~functionalized~~ nanocrystal functionalized to be water soluble, and wherein the opposite terminus of each of the plurality polynucleotide strands of predetermined sequence is unbound to the ~~functionalized~~ nanocrystal functionalized to be water soluble and extends outwardly ~~from~~ therefrom ~~functionalized nanocrystal~~.

2. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 1, wherein reactive functionalities are used to operably link the plurality of polynucleotide strands of predetermined sequence to the ~~functionalized~~ nanocrystal functionalized to be water soluble.

3. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 2, wherein the ~~functionalized~~ nanocrystal functionalized to be water soluble comprises reactive functionalities~~, and wherein a reactive functionality of the reactive functionalities is~~ selected from the group consisting of an amino group, a carboxyl group, thiol-reactive group, and a combination thereof.

4. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 2, wherein each polynucleotide strand of predetermined sequence of the plurality of

polynucleotide strand comprises a reactive functionality selected from the group consisting of an amino-reactive group, a carboxyl-reactive group, and a thiol group.

5. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 1, wherein a linker ~~is used to~~ operably links a polynucleotide strand of predetermined sequence of the plurality of polynucleotide strands to the ~~functionalized~~ nanocrystal functionalized to be water soluble.

6. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 5, wherein the ~~functionalized~~ nanocrystal functionalized to be water soluble further comprises a linker comprising avidin, wherein each polynucleotide strand of predetermined sequence of the plurality of polynucleotide strands further comprises biotin, and wherein the biotin is bound to the avidin.

7. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 1, wherein the ~~functionalized~~ nanocrystal functionalized to be water soluble comprises a core of CdX wherein X is Se, Te, or S ~~semiconductor nanocrystal~~.

8. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 1, wherein the ~~functionalized~~ nanocrystal functionalized to be water soluble comprises a ~~doped metal oxide nanocrystal~~ shell of YZ wherein Y is Cd or Zn, and Z is S or Se.

9. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 1, further comprising a molecular probe operably linked to the ~~functionalized~~ nanocrystal functionalized to be water soluble.

10. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 9, wherein a molecular probe and the ~~functionalized~~ nanocrystal functionalized to be water soluble are operably linked through a bond between: ~~using means selected from the group consisting of by~~ a reactive functionality on one or more of the plurality of polynucleotide strands of predetermined sequence and a reactive functionality associated with the molecular probe, ~~by~~ a reactive functionality on the ~~coating of the functionalized~~ nanocrystal functionalized to be water soluble and a reactive functionality associated with the molecular probe, a linker which has one portion that binds to a reactive

functionality on one or more polynucleotide strands of predetermined sequence and another portion which binds to a reactive functionality associated with the molecular probe, a linker which has one portion that hybridizes to one or more polynucleotide strands of predetermined sequence and another portion which hybridizes to the molecular probe comprising a nucleic acid molecule, ~~and by~~ or synthesizing the molecular probe as part of one or more polynucleotide strands of predetermined sequence.

11. (currently amended): The ~~functionalized nanocrystal~~ composition according to claim 9, wherein molecular probe and the ~~functionalized~~ nanocrystal functionalized to be water soluble are operably linked, wherein the ~~functionalized~~ nanocrystal functionalized to be water soluble further comprises avidin, wherein molecular probe further comprises biotin, and wherein the biotin is bound to the avidin.

12. (currently amended): A composition ~~plurality of functionalized nanocrystals comprised of~~ comprising:

[a] primary ~~functionalized~~ fluorescent core/shell nanocrystal functionalized to be water soluble having a plurality of polynucleotide strands of predetermined sequence according to claim 1, said primary nanocrystal operably bonded to a target molecule, ~~wherein a first species, primary dots, of the plurality of functionalized nanocrystal[s] comprises a plurality of polynucleotide strands of a predetermined sequence; and a second species, secondary dots, of the plurality of functionalized nanocrystals comprises plurality of polynucleotide strands of a sequence complementary to the sequence of the plurality of polynucleotide strands of the primary dot~~.

13. (currently amended): The composition of claim 12 further comprising: a plurality of ~~functionalized~~ secondary fluorescent core/shell nanocrystals functionalized to be water soluble and having ~~comprised of a functionalized nanocrystal according to claim 9, wherein a first species, primary dots, of the plurality of functionalized nanocrystals comprises a plurality of polynucleotide strands of predetermined sequence; and a second species, secondary dots, of the plurality of functionalized nanocrystals comprises~~ a plurality of polynucleotide strands of a sequence complementary to the sequence of the

plurality of polynucleotide strands of predetermined sequence of the primary ~~dot~~ nanocrystal functionalized to be water soluble, said polynucleotide strands of predetermined sequence hybridized to said complementary polynucleotide strands.

14. (currently amended): The ~~functionalized nanocrystal~~ composition of ~~according to~~ claim 13, wherein the intensity of fluorescent emission from the primary ~~dots~~ nanocrystal ~~and~~ hybridized to the secondary ~~dots~~ nanocrystals ~~are of a uniform size~~ is greater than the fluorescent emission of the primary nanocrystal operably bonded to the target molecule.

15. (currently amended): The ~~functionalized nanocrystals according to~~ composition of claim 12, wherein the primary fluorescent core/shell nanocrystal functionalized to be water soluble comprises a core of CdX wherein X is Se, Te, or S ~~polynucleotide strands of the plurality of polynucleotide strands of the primary dots are hybridized to polynucleotide strands of the plurality of polynucleotide strands of the secondary dots.~~

16. (currently amended): The ~~functionalized nanocrystals according to~~ composition of claim 13, wherein the secondary fluorescent core/shell nanocrystal functionalized to be water soluble comprises a core of CdX wherein X is Se, Te, or S ~~polynucleotide strands of the plurality of polynucleotide strands of the primary dots are hybridized to polynucleotide strands of the plurality of polynucleotide strands of the secondary dots.~~